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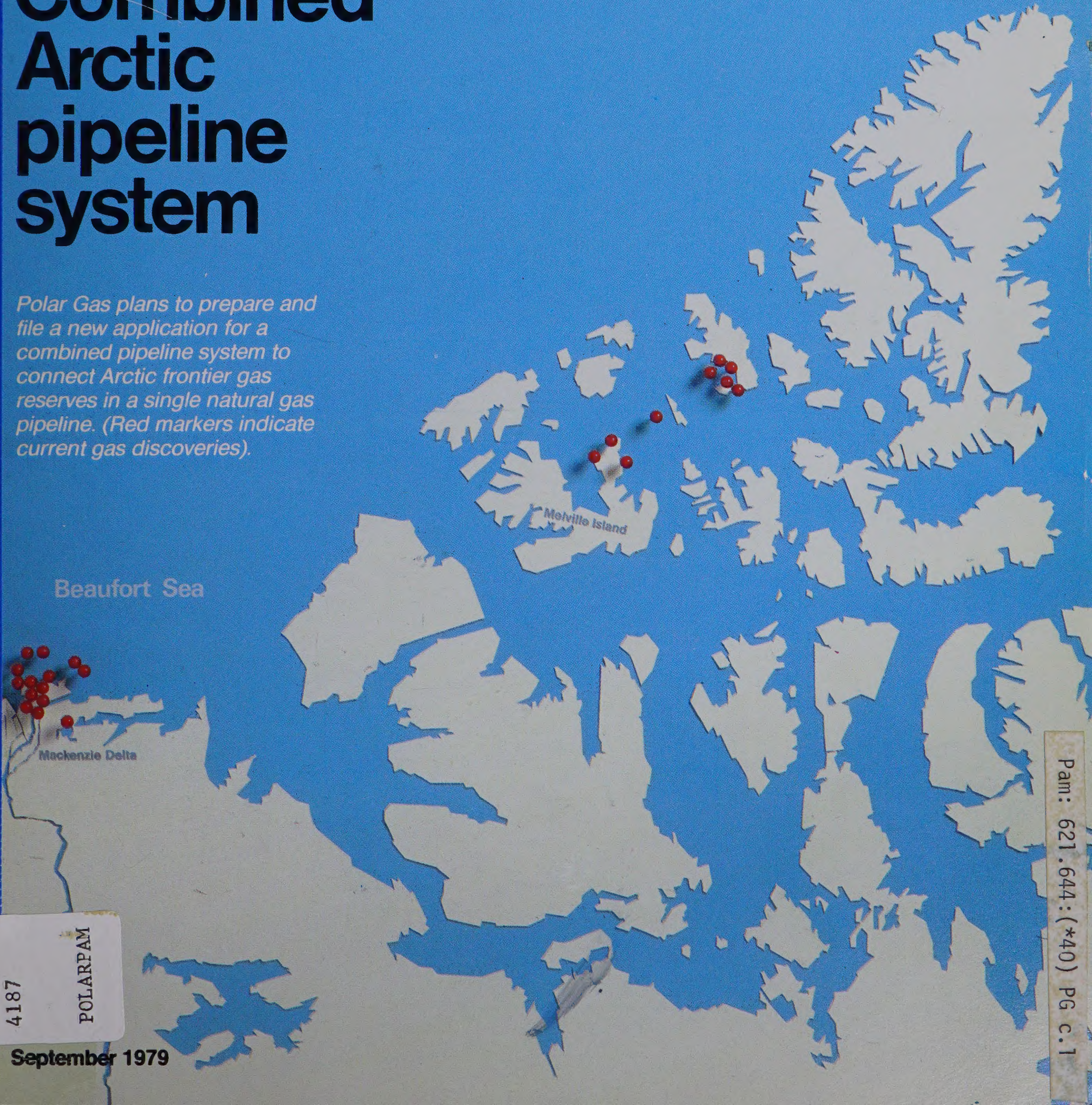
Combined Arctic pipeline system

Polar Gas plans to prepare and file a new application for a combined pipeline system to connect Arctic frontier gas reserves in a single natural gas pipeline. (Red markers indicate current gas discoveries).



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The need is clear and urgent . . .

Recent National Energy Board forecasts indicate that Canada faces an overall energy deficiency, beginning as early as 1982. Throughout the 1980s the country's reliance on imported energy sources will increase and the energy crisis will become increasingly real to Canadians from coast to coast.

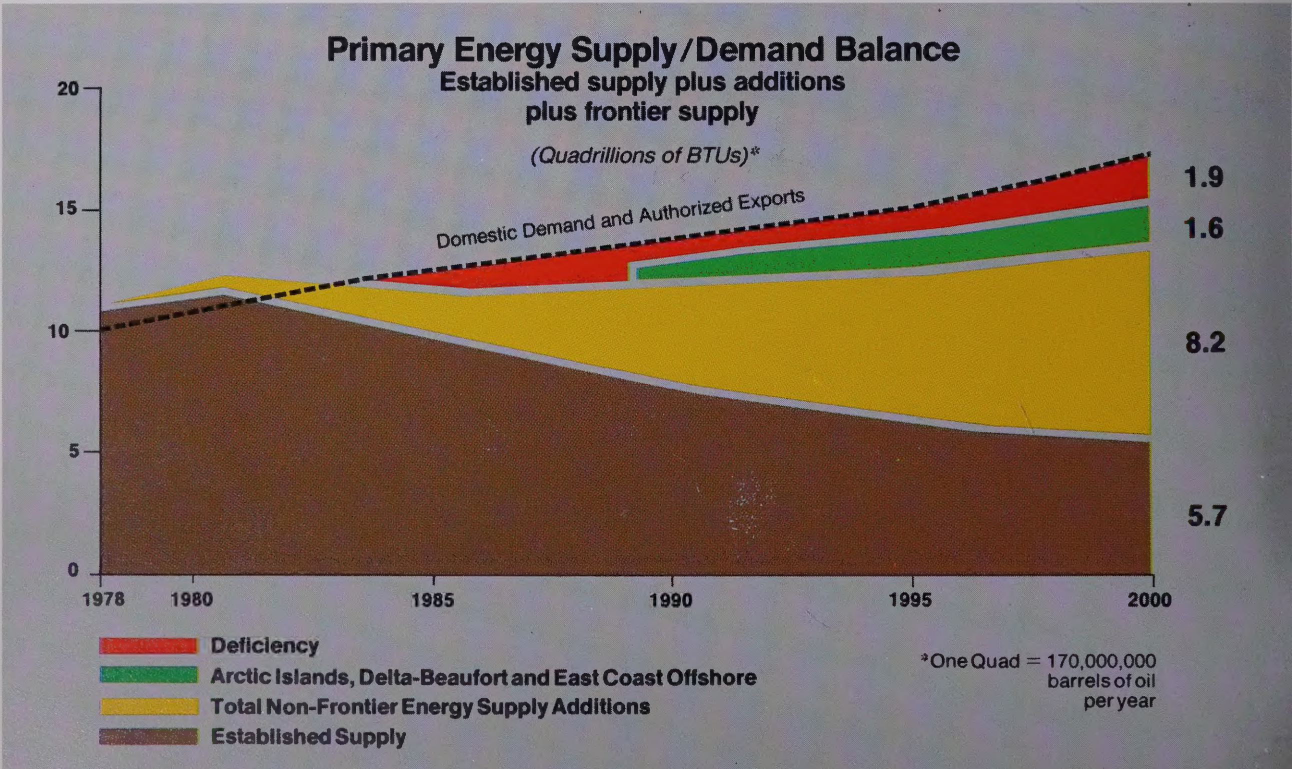
Unlike most countries, Canada has the potential to reduce dependence on foreign oil by developing its own natural resources as a means of achieving energy self-sufficiency.

Polar Gas offers the opportunity to connect natural gas reserves from Canada's two largest Arctic frontier areas in a combined pipeline system. However, it may take up to ten years before gas from the frontier can be delivered to southern markets. This time is required for regulatory review, detailed planning and design, financing, purchasing and moving pipelining materials and eventual construction of the pipeline system.

Despite vigorous conservation, which has reduced the annual growth in demand, Canada's future energy needs will continue to grow.

New markets for natural gas are being developed now and will grow as Canada strives to reduce her dependence on foreign oil. Polar Gas can meet the need by providing for the connection of a large new secure energy source and contribute significantly to Canada's goal of achieving energy self-sufficiency.

The time to act to meet Canada's energy needs for the late 1980's is now.



Source: National Energy Board, Report on Canadian Natural Gas Supply and Requirements, February, 1979.

Rec'd: Nov 5/79
Order No.:
Price: Free
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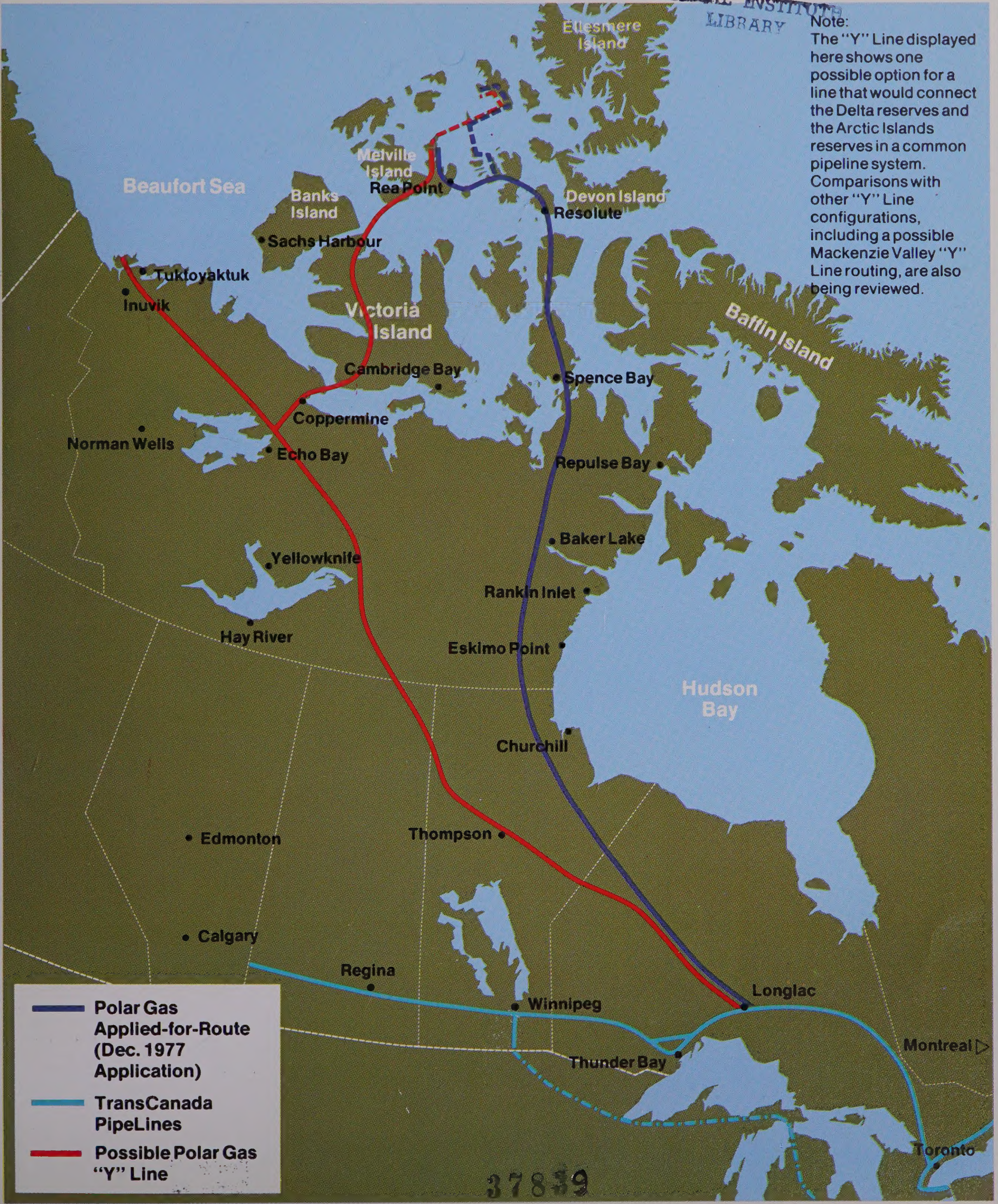

Note:
The "Y" Line displayed here shows one possible option for a line that would connect the Delta reserves and the Arctic Islands reserves in a common pipeline system. Comparisons with other "Y" Line configurations, including a possible Mackenzie Valley "Y" Line routing, are also being reviewed.

▬ Polar Gas Applied-for-Route (Dec. 1977 Application)

▬ TransCanada PipeLines

▬ Possible Polar Gas "Y" Line

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What this resource project will do for Canada . . .

A Polar Gas pipeline will generate significant economic benefits for Canadians as well as connect a new large, secure energy resource which will make a major contribution to Canada's attaining its stated goal of energy self-sufficiency.

A new combined pipeline system, linking the Arctic Islands and the Mackenzie Delta/ Beaufort Sea areas, will generate up to 660,000 man years of employment during the construction phase. Jobs will be created in construction, manufacturing, transportation and service and other jobs will be added throughout the economy as a result of the "ripple effect" associated with the building of the pipeline. This will have the effect of reducing unemployment in Canada by one per cent per year during the construction period and would increase Canada's gross national product by between one and two per cent in the same time frame.

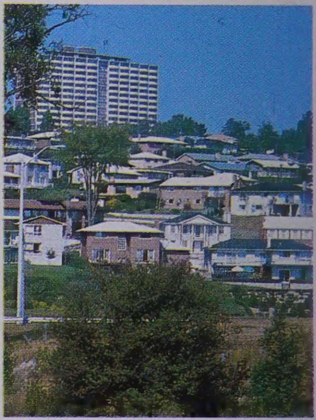
This economic stimulus, beginning during the construction phase, will continue over the life of this major resource project. After completion of construction, 80,000 to 160,000 jobs per year can be attributed to the project during its operating life.

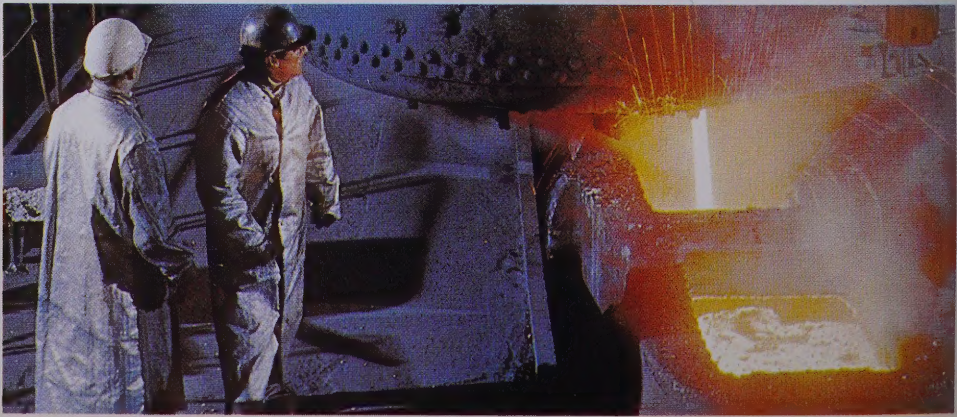
Some of these jobs will relate directly to the operation of the pipeline system. However, significant numbers of jobs will also be created by further exploration and development of the gas fields in the North. The reinvestment of profits, taxes and royalties attributable to operation of the entire project will provide a major impetus to employment creation in primary and secondary manufacturing and service industries.

The pipeline will also contribute to an improved infrastructure and the development of a stronger economy in Canada's North. Moreover, a key factor in Polar Gas planning will be the maximum use of Canadian goods and services. Polar Gas will encourage and in some cases make feasible the establishment of important Canadian facilities to produce such items as pipe, compressors, valves and construction equipment.

In addition, it could enable Canada to export gas surplus to its domestic needs to enhance Canada's balance of payments position.

The Polar Gas Project offers an impressive range of benefits to Canada. It will help Canada achieve its goal of energy self-sufficiency, it will provide a major economic stimulus with long-range job creation potential, it will strengthen and assist in development of Canada's North and it will provide billions of dollars in taxes, royalties and other revenues to government by the connection of this new large secure energy source on Canada's Arctic frontier.





Threshold reserves in sight . . .

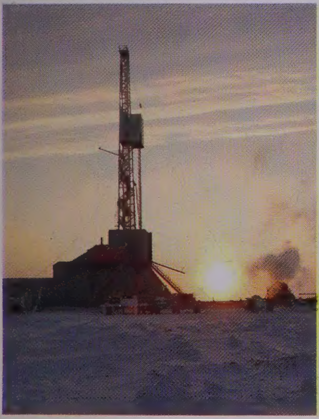
By the end of 1977, exploration in the Arctic Islands had resulted in the discovery of gas reserves, estimated by consultants to Panarctic Oils at 360 billion cubic metres (12.7 trillion cubic feet). In May of 1979, Panarctic Oils announced a major gas discovery at its Whitefish H-63 well. This discovery of a new gas reserve in the Arctic Islands has been described by Panarctic as representing a "material increase in total reserves". The Whitefish field will be redrilled to evaluate fully this gas field.

This discovery at Whitefish H-63 is a very significant development for the Polar Gas Project. With this addition, the threshold reserves are now in sight for a pipeline system to transport natural gas reserves from both the Arctic Islands and the Mackenzie Delta/Beaufort Sea areas in a combined pipeline system.

The established reserves of the Mackenzie Delta are estimated to be 150 billion cubic metres (5.3 Tcf — NEB, February, 1979). When these reserves are added to those already discovered in the Arctic Islands, the total marketable gas reserves currently established in the two areas is close to 510 billion cubic metres (18 Tcf). With the addition of the reserves discovered in 1979 at Whitefish, the 425 to 567 billion cubic metres (15-20 Tcf) required to justify a large diameter pipeline system are now clearly in sight.

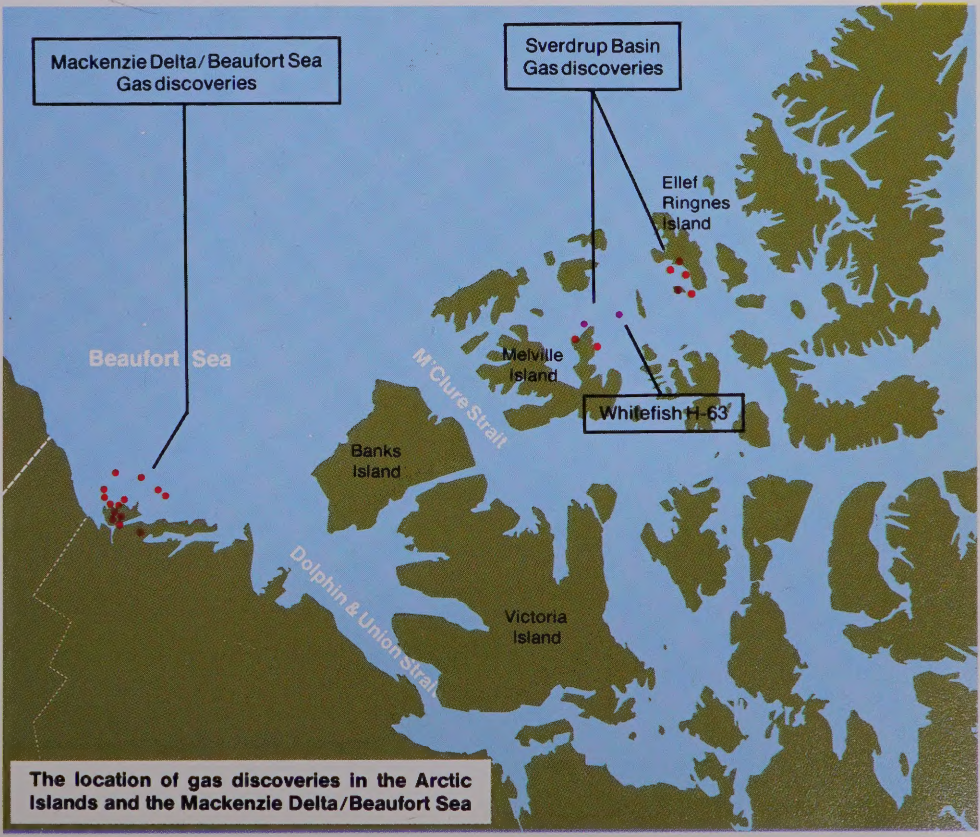
Dome Petroleum has also confirmed a sizeable gas find in the Beaufort Sea, although an estimate of gas reserves from the area is yet to be made.

Future potential is very significant. The federal Department of Energy, Mines and Resources, in a report published in 1977, estimated the ultimate potential (50% probability) of 1,699 billion cubic metres (66 Tcf) in the Delta/Beaufort Sea area. The same report indicates that the Arctic Islands ultimate potential is greater than 1,416 billion cubic metres (50 Tcf). This offers a combined potential of 3,115 billion cubic metres (116 Tcf).



(Above) Drilling in the Arctic Islands and the Mackenzie Delta/Beaufort Sea area has established current marketable reserves of approximately 510 billion cubic metres (18 Tcf).

(Right) With the discovery of natural gas at Panarctic Oils' Whitefish H-63 well, threshold reserves are now in sight for a combined pipeline system to transport natural gas reserves from both the Arctic Islands and the Mackenzie Delta/Beaufort Sea areas.



The location of gas discoveries in the Arctic Islands and the Mackenzie Delta/Beaufort Sea

Technical feasibility confirmed . . . new application planned

Recent advances in deep sea pipelaying technology have made it possible to consider new routing options for the transportation of Arctic Islands gas. In 1976 and 1978 marine pipelines were installed to depths of 396 metres (1,300 feet). Other companies are currently planning to install pipelines to depths of 640 metres (2,100 feet) in the Mediterranean Sea.

Pipelining techniques have also been successfully applied in an Arctic environment. In 1978, to connect a subsea well off Drake Point on Melville Island to onshore facilities, Panarctic Oils pulled a pipeline along the Arctic seabed using winches mounted on the artificially strengthened ice surface. The offshore well was connected to land with this pipeline and successfully production tested.

Advances have also been made in welding techniques. And connections can be made either at the surface or on the seabed.

The application of these and other technological advances in the construction of marine pipelines has allowed Polar Gas to consider a new routing via M'Clure Strait and Victoria Island onto the Canadian mainland near Coppermine, N.W.T. This reduces the number of crossings needed to reach the mainland of Canada from five to two.

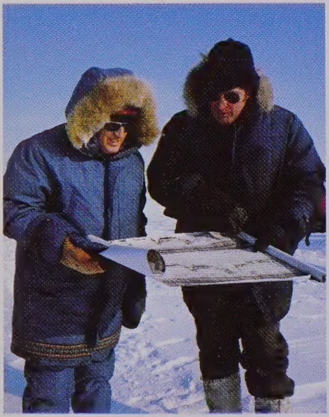
In the Spring of 1979, following six years of Arctic research, Polar Gas undertook additional field studies at M'Clure Strait to confirm the feasibility of a pipeline crossing of this channel.

Detailed information was obtained of the channel bottom profile, sub-bottom characteristics, ice conditions in the strait as well as water temperatures, tides and currents. These studies at M'Clure Strait are now complete and no technical obstacles to marine pipelining were encountered. It has now been confirmed that this channel crossing is technically feasible.

Marine research was conducted on Dolphin and Union Strait during the summer of 1979. A geotechnical overview of the land portion of the route was also carried out to gather data on the terrain types and subsoils. In addition, hydrology studies have been undertaken to collect information at river crossings.

An aerial reconnaissance of alternative routes was undertaken by both engineers and environmental scientists. Studies by Polar Gas staff and consultants dealing with engineering environmental, socioeconomic and construction matters continue.

Following completion of these 1979 studies, Polar Gas plans to prepare and file a new application for a combined pipeline system to transport the natural gas reserves of the Arctic Islands and the Mackenzie Delta/Beaufort Sea areas to southern markets.



(Above) Polar Gas engineers check data obtained during the 1979 on-ice survey of M'Clure Strait. Information was obtained on the channel bottom profile, sub-bottom characteristics and ice conditions as well as water temperatures, tides and currents.

(Above) Special diving chambers can be positioned on the sea bottom to allow pipe to be welded under atmospheric conditions.

(Left) Panarctic Oils recently demonstrated that offshore Arctic wells can be completed and connected by a flow line to onshore facilities. Shown here is the rig-up of a 1,220-metre (4,000-foot) pipeline length that was pulled into place on the seabed by a winch supported on an artificially-thickened ice surface.

On December 1, 1978, Polar Gas President John Houlding advised the National Energy Board that a new route might be possible as a result of recent technological advances. This announcement was made in testimony before the NEB's Natural Gas Supply/Demand hearing in Ottawa.

* * *

"The ability to construct a marine pipeline at greater depths and for longer distances than before has allowed us to make a preliminary examination of a new routing via M'Clure Strait and Victoria Island onto the mainland near Coppermine, and then southeastward to an interconnection with existing systems. Our consultants have provided a preliminary opinion that the crossing of M'Clure Strait is technically feasible."

* * *

"Our preliminary examination has revealed a number of potential advantages. The major and most logical advantage offered is the possibility of combining gas reserves in the Arctic Islands with those in the Mackenzie Valley and Beaufort Sea area into a single transportation system. The total established reserves in these two areas are already very close to that required to support a pipeline."

* * *

On June 26, 1979, following completion of its field studies, Polar Gas advised the National Energy Board that a crossing of M'Clure Strait is technically feasible and that Polar Gas now plans to prepare and file a new application for a combined pipeline system. This information was contained in a letter to the NEB. Excerpts from the letter follow.

"We are pleased to advise that the field studies of M'Clure Strait have been successfully completed. No technical obstacles to marine pipelaying were encountered and it can now be confirmed that this channel crossing is technically feasible. Therefore, studies of combined pipeline systems to connect natural gas from the Arctic frontier to southern markets are underway and will be completed later this year. These studies will permit comparisons of a number of possible routing alternatives that could be used to connect both Arctic Islands and Delta/Beaufort Sea gas reserves in a combined pipeline system."

* * *

"The present application, filed in December 1977, remains a feasible method of connecting the Arctic Islands reserves to southern markets. Following the completion of 1979 studies, the Project plans to file a new application for a combined system."

(Above) The Polar Gas "mule train" moves out onto the ice at M'Clure Strait. The "train" included the scientific and technical instrumentation necessary for the 1979 field survey.

(Far left) Tracked vehicles were used during the on-ice survey of M'Clure Strait to carry drill equipment for ice augering.

(Left) A power ice auger drilled holes through ice up to 9 metres (29 feet) thick. Current meters and gauges were lowered through the ice to gather information on currents and water depths.

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